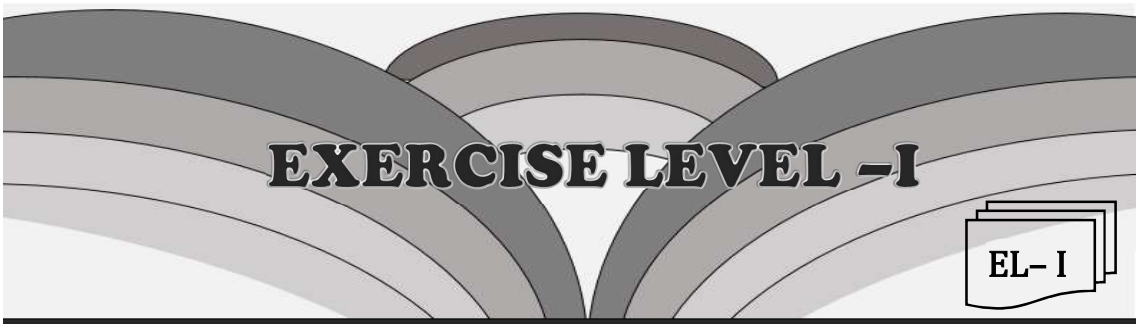



**Q.1** $\lim_{x\to k}(x-[x])$ Where k is an integer, is equivalent to (where $[\cdot]$ signifies the greatest integer function.

(a) 1 (b) 0 (c) –1 (d) Dose not exists

**Q.2** The value of $\lim_{x\to 1}\frac{x^{P+1}-Px-x+P}{(x-1)^2}$; $(P \in N)$ equal.

(a) $\frac{P(P-1)}{2}$ (b) P (c) $\frac{P(P+1)}{2}$ (d) $\frac{P^2-2P}{2}$

**Q.3** The value of $\lim_{x\to 0}\frac{\tan x-\sin x}{x^3}$ equals

(a) 1 (b) $\frac{1}{2}$ (c) $\frac{-1}{2}$ (d) –1

**Q.4** The value of $\lim_{x\to\frac{\pi}{4}}\frac{\sin x-\cos x}{(x-\frac{\pi}{4})}$ equals

(a) $\sqrt{2}$ (b) $\frac{1}{\sqrt{2}}$ (c) 2 (d) $\frac{1}{2}$

**Q.5** The value of $\lim_{x\to 0}\frac{x\tan 2x-2x\tan x}{(1-\cos 2x)^2}$ is equal to

(a) 2 (b) –2 (c) $\frac{1}{2}$ (d) $-\frac{1}{2}$

**Q.6** The value of $\lim_{x\to 0}\frac{\sin(\pi\cos^2 x)}{x^2}$ equals

(a) $-\pi$ (b) $\pi$ (c) $\frac{\pi}{2}$ (d) $2\pi$

**Q.7** The value of $\lim_{x\to 0}\frac{\sqrt{1-\cos 2x}}{x}$ equals

(a) 0 (b) 1 (c) $\sqrt{2}$ (d) Does not exist

**Q.8** The value of $\lim_{\theta\to\frac{\pi}{2}}(\sec\theta-\tan\theta)$ equals

(a) 0 (b) 1 (c) 2 (d) $\infty$

**Q.9** The value of $\lim_{x\to 0}(\frac{1}{x^2}-\cot x)$ is

(a) 1 (b) 0

(c) $\infty$ (d) Limit does not exist

**Q.10** The value of $\lim_{x\to\infty}\left\{\sqrt{x+\sqrt{x+\sqrt{x}}}-\sqrt{x}\right\}$ equals

(a) 0 (b) $\frac{1}{2}$ (c) 2 (d) log 2

**Q.11** The value of $\lim_{x\to 0}\frac{\sin\alpha x-\sin\beta x}{e^{\alpha x}-e^{\beta x}}$ equals

(a) 0 (b) 1 (c) –1 (d) $\alpha-\beta$

**Q.12** The value of $\lim_{x\to 0}\left\{\tan\left(\frac{\pi}{4}+x\right)\right\}^{\frac{1}{x}}$ equals

(a) $e^2$ (b) $e^3$ (c) $e^{-2}$ (d) 1

**Q.13** The value of $\lim_{x\to\infty}\left(\frac{x^2+5x+3}{x^2+x+2}\right)^x$ equals

(a) $e^4$ (b) $e^2$ (c) $e^3$ (d) e

**Q.14** The value of $\lim_{x\to\infty}\left(\frac{x+6}{x+1}\right)^{x+4}$ equals

(a) 0 (b) 1 (c) $e^4$ (d) $e^5$

**Q.15** The value of $\lim_{x\to 0}\{\frac{1+\tan x}{1+\sin x}\}^{\operatorname{cosec} x}$ equals

(a) e (b) $\frac{1}{e}$ (c) 1 (d) 0

**Q.16** The value of $\lim_{x\to 0}(\frac{a^x+b^x+c^x}{3})^{\frac{1}{x}}$ equals

(a) $(abc)^{\frac{1}{3}}$ (b) $\frac{1}{3}(abc)$ (c) $\log(abc)^{\frac{1}{3}}$ (d) 1

**Q.17** The value of $\lim_{x\to 0^+}((\sin x)^{\frac{1}{x}}+(\frac{1}{x})^{\sin x})$ equals

(a) 0 (b) 1 (c) $\infty$ (d) –1

**Q.18** The value of $\lim_{x\to 0}|x|^{\sin x}$ equals

(a) 0 (b) –1 (c) 1 (d) Dose not exists

**Q.19** If $y=\log(\sec x+\tan x)$, then $\frac{dy}{dx}=$

(a) $\tan x$ (b) $\sec x$ (c) $\tan^2 x$ (d) $\sec^2 x$

**Q.20** Let $f(x)=\log(x+\sqrt{x^2+1})$, then $f'(x)$ equals

(a) $\sqrt{x^2+1}$ (b) $\frac{x}{\sqrt{x^2+1}}$ (c) $1+\frac{x}{\sqrt{x^2+1}}$ (d) $\frac{1}{\sqrt{x^2+1}}$

**Q.21** Let $f(x)=e^x\cdot g(x), g(0)=4, g'(0)=2$, then $f'(0)$ equals

(a) 1 (b) 2 (c) 3 (d) 6

**Q.22** The value of $\frac{dy}{dx}$ is, when $y=f\left(\frac{1}{x}\right)$ and $f'(x)=\sin(x^2)$

(a) $-x^2\sin\left(\frac{1}{x^2}\right)$ (b) $\frac{-1}{x^2}\sin(x^2)$ (c) $\frac{-1}{x^2}\sin\left(\frac{1}{x^2}\right)$ (d) $-x^2\sin(x^2)$

**Q.23** If $\sqrt{x}+\sqrt{y}=4$, then $\frac{dy}{dy}$ at $x=1$ is given by

(a) 3 (b) –1 (c) –3 (d) 1

**Q.24** If $y=|\cos x|+|\sin x|$, then $\frac{dy}{dx}$ at $x=\frac{2\pi}{3}$ is

(a) $\frac{1-\sqrt{3}}{2}$ (b) 0 (c) $\frac{1}{2}(\sqrt{3}-1)$ (d) $\frac{\sqrt{3}+1}{2}$

**Q.25** The value of $\lim_{x\to 0}\frac{\log\cos x}{x}$ is equal to

(a) 0 (b) $\infty$ (c) 1 (d) Does not exist

**Q.26** If $\lim_{x\to a}\frac{a^x-x^a}{x^x-a^a}=-1$, then

(a) $a=1$ (b) $a=0$ (c) $a=e$ (d) $a=\frac{1}{e}$

**Q.27** The value of $\lim_{x\to 0}\frac{x\cos x-\log(1+x)}{x^2}$ is equal to

(a) $\frac{1}{2}$ (b) 0 (c) 1 (d) Does not exist

**Q.28** The value of $\lim_{x\to 0}\frac{(1-x)^n-1}{x}$ equals

(a) n! (b) $(n-1)!$ (c) $-n$ (d) n

**Q.29** If $G(x)=-\sqrt{25-x^2}$, then $\lim_{x\to 1}\frac{G(x)-G(1)}{x-1}$ has the value

(a) $\frac{1}{24}$ (b) $\frac{1}{5}$ (c) $-\sqrt{24}$ (d) $\frac{1}{\sqrt{24}}$

**Q.30** The value of $\lim_{x\to\frac{\pi}{3}}\frac{\sin\left(\frac{\pi}{3}-x\right)}{2\cos x-1}$ equals

(a) $\frac{1}{2}$ (b) $\frac{1}{\sqrt{3}}$ (c) $\sqrt{3}$ (d) $\frac{2}{\sqrt{3}}$

**Q.31** The value of $\lim_{x\to 0}\frac{e^{x^2}-\cos x}{x^2}$ equals

(a) $\frac{3}{2}$ (b) $\frac{1}{2}$ (c) $\frac{2}{3}$ (d) 2

**Q.32** The value of $\lim_{x\to y}\frac{\sin^2 x-\sin^2 y}{x^2-y^2}$ equals

(a) 0 (b) 1 (c) $\frac{\sin y}{y}$ (d) $\frac{\sin 2y}{2y}$

**Q.33** The value of $\lim_{x\to 0}\frac{(4^x-1)^3}{\sin\frac{x}{4}\cdot\log(1+\frac{x^2}{3})}$ equals

(a) $3(\log 4)^3$ (b) $4(\log 4)^3$ (c) $12(\log 4)^3$ (d) $15(\log 4)^3$

**Q.34** The integer n for which $\lim_{x\to 0}\frac{(\cos x-1)(\cos x-e^x)}{x^n}$ is a finite non-zero number, is

(a) 1 (b) 2 (c) 3 (d) 4

**Q.35** $\lim_{x\to 0}\frac{\sin(nx)((a-n)nx-\tan x)}{x^2}=0$, when n is a non-zero positive integer, then a is equal to

(a) $\frac{n+1}{2}$ (b) $n^2+1$ (c) $\frac{1}{n+1}$ (d) $n+\frac{1}{n}$

**Q.36** If $f(x)=\frac{x-3}{x+4}, g(x)=-\frac{2(2x+1)}{x^2+x-12}$ and $r(x)=\frac{2}{x-3}$, then value of $\lim_{x\to 3}\{f(x)+g(x)+r(x)\}$ is

(a) Zero (b) $\frac{2}{7}$ (c) $-\frac{2}{7}$ (d) $-1$

**Q.37** Value of $\lim_{x\to\infty}(\frac{1}{x}-\frac{1}{x^2}+\frac{1}{x^3}-\cdots\ldots\infty)^{\frac{1}{x}}$ is equal to

(a) Zero (b) $\frac{1}{e}$ (c) e (d) 1

**Q.38** Value of $\lim_{x\to 0}\frac{1-\cos(1-\cos x)}{x^4}$ equals

(a) $\frac{1}{4}$ (b) $\frac{1}{8}$ (c) $\frac{1}{16}$ (d) $-\frac{1}{16}$

**Q.39** If $\lim_{x\to 0}\frac{x(1+p\cos x)-q\sin x}{x^3}=2$, then the value of $p+2q$ equals

(a) $-\frac{9}{2}$ (b) $-\frac{11}{2}$ (c) $-\frac{29}{2}$ (d) $-\frac{31}{2}$

**Q.40** The value of $\lim_{x\to\infty}\frac{(x+2)(4x+5)}{x^2(x+6)}$ is equal to

(a) Zero (b) 1 (c) 4 (d) $\frac{5}{3}$

**Q.41** If $f(x)=x^2\ln x$, then $f'(e)$ equals

(a) e (b) 2e (c) 4e (d) 3e

**Q.42** If $y=|\sin 2x|+|\tan x|$, then value of $\frac{dy}{dx}$ at $x=\frac{3\pi}{4}$ is

(a) $-\frac{1}{2}$ (b) $\frac{1}{2}$ (c) $-2$ (d) 2

**Q.43** If $y=|\tan x|+|\sec x|$, then $\frac{dy}{dx}$ at $x=\frac{5\pi}{6}$ is

(a) –2 (b) 2 (c) $-\frac{2}{3}$ (d) $\frac{2}{3}$

**Q.44** If $y=|\sin x|$, then value of $\frac{dy}{dx}$ at $x=\frac{3\pi}{4}$ is

(a) $-\frac{1}{2}$ (b) $\frac{1}{2}$ (c) $-\frac{1}{\sqrt{2}}$ (d) $\frac{1}{\sqrt{2}}$

**Q.45** The value of $\lim_{x\to 0}\frac{\sin(\pi\cos^2 x)}{x^2}$ is

(a) $\pi$ (b) 0 (c) $\frac{\pi}{2}$ (d) 2

**Q.46** Let $\lim_{x\to 0}\frac{\sin 2x}{\tan(\frac{x}{2})}=L_1$ and $\lim_{x\to 0}\frac{e^{2x}-1}{x}=L_2$, then the value of $L_1L_2$ is

(a) 4 (b) 8 (c) 6 (d) 2

**Q.47** $\lim_{x\to 0}\frac{2^x-1}{x}+\lim_{x\to 0}\frac{3^x-1}{x}-\lim_{x\to\infty}(\frac{6^x-1}{x})$ equals

(a) 1 (b) 2 (c) 0 (d) 4

**Q.48** $\lim_{x\to 0}\frac{\log(1+2x)}{x}+\lim_{x\to 2}\frac{x^4-2^4}{x-2}$ equals

(a) 30 (b) 32 (c) 35 (d) 34

**Q.49** $\lim_{x\to -}\frac{\sin x}{x}+\lim_{x\to-\infty}\frac{\log x}{x}$ equals

(a) 0 (b) 1 (c) 3 (d) $\infty$

**Q.50** $\lim_{x\to 0}\frac{2^x-1}{\sqrt{1+x}-1}=$

(a) 2 (b) $\log_6 2$ (c) $\frac{\log_e 2}{2}$ (d) $2\log_6 2$

**Q.51** $\lim_{x\to 1}(\sec\frac{\pi}{2^x})\cdot\ln x$ is equal to

(a) $\frac{\pi}{2}$ (b) $-\frac{2}{\pi\ln 2}$ (c) $\frac{2}{\pi\ln 2}$ (d) $\frac{\pi}{\ln 2}$

**Q.52** $\lim_{x\to 0}\frac{\sin 2x}{2-\sqrt{4-x}}$ is

(a) 2 (b) 4 (c) 8 (d) 0

**Q.53** $\lim_{x\to 0}\frac{1-\cos x}{x\sqrt{x^2}}$ equals

(a) $\frac{1}{2}$ (b) $-\frac{1}{2}$ (c) 0 (d) Does not exist

**Q.54** $\lim_{x\to 0^+}((x\cot x)+(x\log x))$ equals

(a) 1 (b) 2 (c) 3 (d) 0

**Q.55** $m, n \in I^+$, then $\lim_{x\to 0}\frac{\sin x^n}{(\sin x)^m}$ equals

(a) 1, if $n < m$ (b) 0, if $n = m$ (c) $\frac{n}{m}$ (d) 0, if $n > m$

**Q.56** $\lim_{x\to\infty}\frac{(1+x+x^2)}{(\ln x)^3}$ is equal to

(a) 2 (b) $e^2$ (c) $e^{-2}$ (d) $\infty$

**Q.57** $\lim_{x\to d}(\frac{4^x+9^x}{2})^{\frac{1}{x}}$ equals

(a) 2 (b) 6 (c) 16 (d) 112

**Q.58** If $\lim_{x\to\infty}(1+\frac{a}{x}+\frac{b}{x^2})^{2x}=e^2$, then the values of a and b are

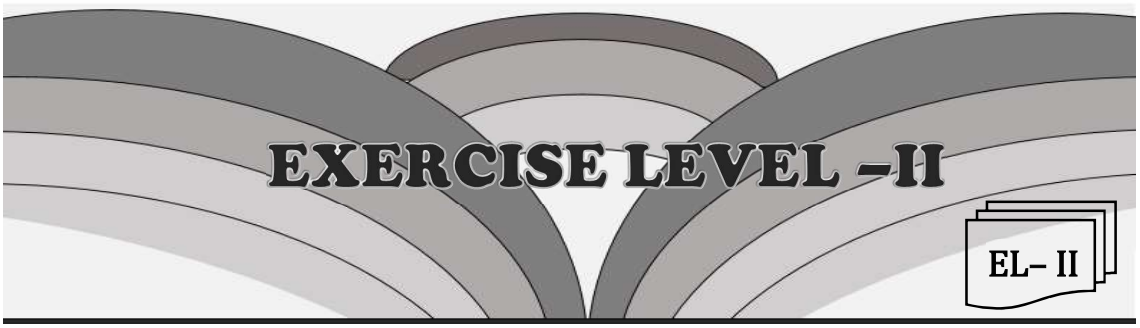
(a) $a \in R, b \in R$ (b) $a = 1, b \in R$ (c) $a \in R, b = 2$ (d) $a = 1, b = 2$

**Q.59** If $\alpha, \beta$ are roots of $ax^2+bx+c=0$, then $\lim_{x\to\alpha}(1+ax^2+bx+c)^{\frac{1}{x-\alpha}}$ is

(a) $a(\alpha-\beta)$ (b) $\log e^1(\alpha-\beta)$ (c) $e^{a(\alpha-\beta)}$ (d) $e^{a(\alpha+\beta)}$

**Q.60** If $\lim_{x\to 0}(\cos x+a\sin bx)^{1/x}=e^2$, then the values ofa and b can be

(a) $a = 1, b = -2$ (b) $a = 2\sqrt{2}, b = \sqrt{2}$ (c) $a = 2\sqrt{2}, b = \frac{1}{\sqrt{2}}$ (d) $a = -2, b = 1$




**Determine the limits for the following in Questions 1 to 4.**

**Q.1** $\lim\limits_{z\to 1}\frac{z^{\frac{1}{3}}-1}{z^{\frac{1}{6}}-1}$

**Q.2** $\lim\limits_{x\to 1}\frac{ax^2+bx+c}{cx^2+bx+a}, a+b+c\neq 0$

**Q.3** $\lim\limits_{x\to \pi}\frac{\sin(\pi-x)}{\pi(\pi-x)}$

**Q.4** $\lim\limits_{r\to 1}\pi r^2$

**Q.5** Find $\lim\limits_{x\to 1} f(x)$, where $f(x)=\begin{cases}2x+3 & x\leq 0\\ 3(x+1) & x>0\end{cases}$

**Q.6** If the function f(x) satisfies, $\lim\limits_{x\to 1}\frac{f(x)-2}{x^2-1}=\pi$, evaluate $\lim\limits_{x\to 1} f(x)$

**Q.7** Find the value $\lim\limits_{x\to 0}\frac{\sqrt{x+1}-1}{x}$

**Q.8** Find the value $\lim\limits_{x\to 0}\frac{\sin 5x}{\tan 3x}$

**Q.9** Find the value $\lim\limits_{x\to 0}\frac{1-\cos 5x}{1-\cos 6x}$

**Q.10** Find the value $\lim\limits_{x\to 0}\frac{(x+1)^5-1}{x}$

**Q.11** Find the value $\lim\limits_{x\to 0}\frac{1-\cos x}{\sin^2 x}$

**Q.12** Determine the derivative of the function sec x.

**Q.13** Determine the derivative of the function $\frac{1}{\sqrt{x}}$..

**Q.14** Determine the derivative of the function $x^2\cos x$.

**Q.15** Determine the derivative of the function $e^{\sqrt{\tan x}}$

**Q.16** Calculate the derivative of the function $f(x)=(3x+2)^{3/2}$ with respect to x.

## ANSWER KEY – LEVEL – I

| Q. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Ans. | d | c | b | a | c | b | d | a | d | b |
| Q. | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| Ans. | B | a | a | d | c | a | b | c | b | d |
| Q. | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| Ans. | D | c | c | c | a | a | a | c | d | b |
| Q. | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| Ans. | a | d | c | c | d | c | d | b | c | a |
| Q. | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| Ans. | d | c | a | c | a | b | c | d | a | d |
| Q. | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| Ans. | c | c | d | a | d | d | b | b | c | c |

## ANSWER KEY – LEVEL – II

**1.** 2

**2.** 1

**3.** $\frac{1}{\pi}$

**4.** $\pi$

**5.** $\lim\limits_{x\to 1} = 6$

**6.** $\lim\limits_{x\to 1} f(x) = 2$

**7.** $\frac{1}{2}$

**8.** $\frac{5}{3}$

**9.** $\frac{25}{36}$

**10.** 5

**11.** $\frac{1}{2}$

**12.** $\sec x \tan x$

**13.** $-\frac{1}{2\sqrt{x^3}}$

**14.** $2x \cos x - x^2 \sin x$

**15.** $e^{\sqrt{\tan x}} \frac{\sec^2 x}{2\sqrt{\tan x}}$

**16.** $\frac{9}{2}(3x+2)^{\frac{1}{2}}$